

THE UTILITY OF ENZYMES
IN MALARIA.

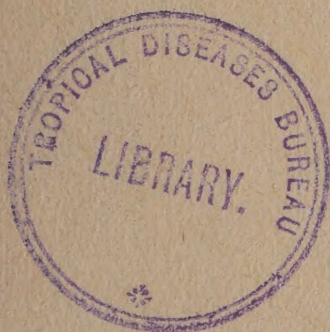
BY

F. W. LAMBALLE, M.B.
Major, Royal Army Medical Corps.

REPRINTED FROM
THE
MEDICAL RECORD
November 22, 1913

WILLIAM WOOD & COMPANY
NEW YORK

WELLCOME INSTITUTE LIBRARY	
Coll.	we/TROMec
Call	Pam
No.	Wc 750
	1913.
	L21u



22200129195

THE UTILITY OF ENZYMES IN MALARIA.

By F. W. LAMBALLE, M.B.,

MAJOR, ROYAL ARMY MEDICAL CORPS.

I TAKE up a recent book,¹ which mirrors accurately enough current opinion, and there I read "Quinine is the one specific for all kinds of malarial fevers as it absolutely destroys the malarial parasites." This is the general teaching of the schools, and when one first begins tropical practice one relies upon quinine as a certain cure for malaria. Some ten years ago experience led me to doubt this infallibility. In Hongkong about that time malaria was the chief cause of sickness among the troops. Speaking from memory the admission rate to hospital for malaria was about 2,400* per thousand. Quinine in various forms, orally and hypodermically, in different courses of treatment was tried, but no method could be relied upon to obviate a relapse. During my service in Hongkong I should have had no difficulty in producing many cases showing records of 7 or 8 relapses.

These relapse cases have been a matter of concern because of the ensuing inefficiency, and recently with the troops in India efforts have been made to systematize the quinine treatment, to ensure that quinine is taken in sufficient doses, and

*The number 2,400 is correct. A startling number—the equivalent of *every man in garrison being a patient in hospital nearly two and a half times every year!*

that the treatment is spread over a sufficiently long time. These measures are complete enough as the following details will show: (1) No case of fever is diagnosed as malarial until the parasite has been recovered from the blood. (2) No case of malaria leaves hospital until the peripheral blood is *negative*, showing no parasites. (3) After leaving hospital all malaria patients attend for further treatment on a "malaria register." (a) *Benign cases* receive quinine sulphate in acid solution, gr. x, daily for one *week*, and afterwards three times weekly until four months of quinine treatment has been completed.

(b) *Malignant cases* receive quinine in the same form, gr. x daily for one *month*, and afterwards thrice weekly for three months longer. And yet relapses occur. Patients return to hospital deaf from cinchonism, ill with fever, and showing parasites in their peripheral blood.

I think the impression is very general that benign cases are cured easily and relapses rarely. Here in Upper Burma there seems little distinction between benign and malignant cases as regards their curability under quinine. Relapses seem as frequent in the one infection as in the other, the only difference being in the cachexia, which is persistent and progressive in bad cases of malignant infection. Major Lelean, R.A.M.C., writing in the *Journal of the Army Medical Corps* (November, 1911), has had the same experience in the 7th Division in India. I quote his figures as they show the importance of the subject: "Statistics have been kept which show the relapses occurring among a total of 1,053 malarial patients who attended hospital at Meerut for three months subsequent to their discharge. During that period they received 15 grains

of quinine on two days per week. The drug was administered in solution and in the presence of an assistant surgeon, who kept a roster of these men and strictly enforced their regular attendance. We do not know what the mean daily strength was exactly, but it must have been approximately 170 for the eighteen months during which the results were kept. In that period there were 734 recurrences among these men, *i.e.* at the rate of 489 per year. It is, of course, obvious that this is but an approximate calculation, but it shows a per mille per annum attack rate amongst these men of no less than 2,876, which affords a considerable margin for error without losing its startling character." And continuing, he reiterates in slightly different form the question I have already suggested "Within comparatively recent years it has been taught that the action of quinine upon malarial parasites was so certain that quinine could be relied upon for clinical diagnosis. Was that teaching correct?" I think not. Quinine has its sphere of usefulness, but it is an empirical remedy—a fundamental fact we have forgotten because the remedy is so time-honored.

In the foregoing I have used the word *relapse* in the ordinary medical acceptation of the term as applied to any disease—a recurrence. Colonel R. H. Firth, in the *Journal of the Army Medical Corps* (February, 1913), in speaking of apyrexial malaria wishes a distinction to be drawn between *relapse* and *recrudescence*. By *recrudescence of infection* he speaks of a recurrence of the fever due to increased schizogony of the parasite after a period of apyrexia. By *relapse of infection* he indicates a recurrence of the fever due to a reversion to schizogony after the establishment of sexual forms in the blood. Professor Minchin,² in his

"Introduction to the Study of the Protozoa," says "in the 'incubation' period of the disease schizogony alone occurs in all probability, but when the numbers of the parasite are sufficient to affect the health of the host the reaction of the host against the parasite probably stimulates the production of the propagative phases and Schaudinn has described the changes of the trophozoites which become sporonts."

In the light of the recent work³ of my friend, Dr. John Beard, on the occurrence of dextrorotatory albumins in organic nature and the part played by ferments in the protection of the animal body all these things find a ready explanation. Schizogony of the parasite produces the clinical disturbance we call fever, the sexual forms are harmless and the asexual growth of the parasite, as is the common feature with all asexual growths, can proceed to an unlimited number of generations or cell-divisions until checked by the natural protective ferments of the animal body. Just as the trophoblast is checked in its growth by the ferments of the developing embryo (Beard), so the natural protective ferments of the host react against the asexual phase of the parasite and sexual forms begin to appear. The varying degree of immunity, the degree to which the malaria remains dormant, is a measure of these natural protective ferments. In like manner, as these ferments are insufficient to destroy the asexual forms, the disease recurs. There is no essential pathological difference between the cases termed "relapse" and those called "recrudescence." Clinically there is a difference only as to the time which has passed since infection. Before leaving this portion of the subject reference should be made to the recent publication⁵ by Prof. Emil Abderhalden on "Protective Ferments of the Animal Organism."

In this work the author has gone a long way in the same direction as Dr. Beard's researches have led him.

In 1907 it was foreseen, and foretold, by Dr. Beard, that the parasites of malaria would be readily destroyed by the enzyme trypsin, and the scientific principles involved have been enunciated by him in papers published in 1907 and 1913.^{3, 4} It may be of interest to cite one scientific conclusion from his recent memoir. In this Beard³ writes: "Since the organisms underlying the chief tropical diseases, such as malignant malaria, trypanosomiasis, sleeping sickness, yellow fever, relapsing fever, kalaazar, etc., are, so far as these attack human beings, asexual generations, it follows that the natural means of destroying the organisms of such tropical diseases and of curing the patients are the use *in combination* of the powerful pancreatic ferments, trypsin, and amylopsin."

Not until January, 1913, did the opportunity come to me of putting these principles into practice in cases of tropical disease and of seeing whether under treatment by ferments these relapses in malaria were preventable. As a test for this enzyme-treatment out of about 100 the cases of severe infection and those showing relapses were selected. Clinically, the results are most marked, the change in the patient within a few hours remarkable, and the benefit permanent. As circumstances have arisen which have interrupted this work, and as I do not know when I can carry the observations further, I think that these clinical results demonstrating the utility of the pancreatic ferments in the severer forms of malarial infection should be recorded.

For a discussion of the nomenclature of the or-

ganisms of malaria reference may be made to: Doflein, F.—“Lehrbuch der Protozoenkunde,” 3te Auflage, Jena, 1911, pp. 774-788. Following him and adopting *Plasmodium* as the generic name, the two forms dealt with in the following are *Laverania malariae*, the organism of malignant tertian malaria, and *Plasmodium vivax*, that of benign tertian malaria.

The method of treatment has been by intramuscular injections of the enzymes, trypsin and amylopsin. My acknowledgments are due to Messrs. Fairchild Brothers & Foster for the injections employed in the following cases. Both ferments are supplied in glass-ampoules holding about one cubic centimeter. The injectio trypsini has a digestive value of 1,250 Roberts units and it is the most potent preparation of trypsin made. The injectio amylopsini is of maximum potency and contains 500 Roberts amylolytic units. The preparations are sterile and stable. I have kept some of these ampoules for nine months in Central India without appreciable loss of strength. Before injection the contents of each ampoule should be diluted with normal saline 1 in 5. Latterly I have found, when using these ferments in other diseases, that by using *two needles*, which should be as fine as possible, the pain, which often follows injections of trypsin, may be avoided. The one needle is used to take up the injection into the syringe, the second one, which in this way has no trypsin upon it, to make the actual injection. My usual practice is to take up the contents of one ampoule of trypsin and of one ampoule of amylopsin in a 10 c.c. syringe, and then fill the syringe with sterile normal saline. This amount I usually give as a single dose. Baetzner,⁹ using the same preparations in surgical tuberculosis, gives his

injections hypodermically, but I prefer to give the injections intramuscularly and select the buttock, finding that patients suffer the least inconvenience in this way. Using ordinary surgical technique in giving these injections, I have made some hundreds after this fashion and no harm has ensued. The ferments diffuse slowly from the tissue into which they are injected, and some local edema remains for 12 to 24 hours, when it disappears. The local pain is little more than that due to the needle prick. The effect of the trypsin on the normal tissues at the site of injection is practically nil.

But the general effect, as seen in the cerebral type of case, is marked. The headache vanishes, the patient's restlessness ceases, the skin becomes moist and the temperature falls, the patient's aspect is changed totally in a few hours and he feels fresh and looks bright. As a rule a single injection is sufficient to clear the peripheral blood of parasites. But in severe infections I think that *three injections* given at intervals of about four days, are necessary to effect a cure. My previous experience⁶ in the use of ferments in malignant disease has led me to repeat the injections, until the injections themselves cause a rise in the patient's temperature. This I have elsewhere called a "trypsin reaction." When this happens, I know that the patient is fully under the influence of the treatment. Usually this occurs in malaria with the third injection, and having proceeded so far the worst cases* I have to deal with have remained free from relapse.

CASE I.—Private C., No. 9,457.—Malignant tertian ma-

*The following cases were all those of British infantry soldiers. Three natives (Gurkhas) were also treated, but my notes of these cases are too fragmentary for inclusion.

laria with hematuria. Contracted malaria in Maymyo, Burma, November, 1912. December 5, 1912.—Admitted to hospital. Temperature 101° F. *Malignant tertian rings* found in peripheral blood. Quinine gr. x thrice daily. December 6, 1912.—Morning temperature 103° F., evening temperature 102.4° F. Hematuria appeared. Quinine stopped. Arsenic given. December 7 and 8, 1912.—Temperature normal, but hematuria continuing. December 16, 1912.—Apparent recovery. Discharged from hospital, but ordered to attend daily and to receive a daily dose of gr. x of quinine for one month.

Relapse.—January 11, 1913.—Readmitted to hospital. Evening temperature 100° F. *Malignant tertian rings and crescents* found in peripheral blood. Quinine gr. x given thrice daily. January 13 to 16.—Evening temperature 100° to 102° F. each evening. January 17.—Quinine treatment stopped. *First* injection of trypsin and amylopsin. Evening temperature 100° F. January 19.—Evening temperature 101° F. Blood shows crescents. January 21.—Evening temperature 101.6° F. January 23.—Evening temperature 96° F. January 24.—*Second* injection of trypsin and amylopsin. Six hours after this injection the patient's temperature rose to 100° F., but the peripheral blood showed no parasites. January 25 and 26.—Blood negative. No symptoms. January 31.—*Third* injection of trypsin and amylopsin. Discharged from hospital. The patient was seen by me on March 16, April 27, and May 31, 1913, and he has had no further symptoms.

CASE II.—Private G., No. 9,876.—Malignant malaria with relapses. Contracted malaria in August, 1912, and was treated in hospital from August 22 to September 2, 1912, *malignant tertian rings* being found in the peripheral blood. The *first relapse* occurred in December, 1912. Patient in hospital from December 13 to 19, 1912, when again *malignant tertian rings* were found. Patient had been continuously under quinine treatment from August 22, 1912, to January 2, 1913—the regulation four months' course of treatment.

Second relapse took place in January, 1913, patient being admitted to hospital on January 29. He was deaf from cinchonism, the blood-smears were repeatedly negative, showing no parasites, but the patient's temperature each evening rose to about 100° F. He was discharged from hospital on February 11 and ordered to attend daily for further quinine treatment.

Third relapse.—On March 2, 1913, patient was attending for his daily dose of quinine, when he appeared to me to look so ill that I detained him in hospital. His evening temperature was 99.2° F. and blood examination negative. March 3—Admitted to hospital, complaining of pains all over, worst in bones and joints. March 4.—Blood showed *malignant tertian rings*. In the evening the temperature rose to 103° F. and patient became delirious, showing cerebral symptoms. March 5.—Very severe headache. *First* injection of trypsin and amylopsin. March 6.—Headache gone. Feels well. Temperature in evening 99.6° F. March 7.—No headache or other signs. *Second* injection of trypsin and amylopsin given. March 9.—Temperature normal, neither signs nor symptoms, blood negative. March 12.—Continuing normal without symptoms. *Third* injection of trypsin and amylopsin given. This was followed by a rise of temperature to 102.4° F. Blood-smear negative. March 13.—Blood-smears again taken; no parasites found. Leucocyte count: Polynuclear 50 per cent., large mononuclear 17.3 per cent., lymphocytes 24.7 per cent., eosinophile 8 per cent. The changes in the large mononuclear and eosinophile white blood cells are noteworthy. March 16.—Discharged to duty. April 16 and May 19 the patient was seen by me. No further symptoms.

CASE III.—Lance Corporal J., No. 8,459.—Contracted malaria in October, 1912. Was treated in hospital between October 25 and 30, 1912, benign tertian rings being found in the blood. The quinine treatment was continued from October, 1912, to February 28, 1913, *i.e.* a four months' course. On March 8, 1913, patient had a typical attack of ague in barracks and was not seen by a medical officer. On March 10, 1913, patient was brought to hospital with a temperature of 104.2° F., and malignant tertian rings were found in the blood. March 12.—*First* injection of trypsin and amylopsin was given. March 15.—*Second* injection was given. March 18.—*Third* injection was given. March 23.—Discharged to duty. Up to June 16, 1913, patient has had no relapse and no further symptoms. Query: was this case a mixed infection of benign and malignant malaria, or a fresh infection of malignant malaria while the patient was taking quinine?

CASE IV.—Private T., No. 9,141.—Benign tertian malaria. States he first had malaria in Rangoon some two years ago, and that he has been stationed in Mandalay since June, 1912, arriving in Maymyo, Burma, on March 8, 1913.

While in Mandalay he had five relapses of malaria. March 11, 1913.—Detained with severe ague. Temperature 103.8° F. Benign tertian rings and gametes in peripheral blood. March 12.—Admitted to hospital, Evening temperature 103.8° F. March 15.—*First* injection of trypsin and amylopsin. March 18.—*Second* injection. Blood negative. March 22.—*Third* injection. March 25.—Discharged to duty. Up to June 16, 1913, no relapse and no further symptoms.

CASE V.—Lance Corporal G., No. 6,638.—Benign tertian malaria. Contracted malaria in December, 1912. Was treated in hospital December 28, 1912, to January 5, 1913. Relapse on March 14, 1913. Temperature 102° F. Blood-smear showed *benign tertian rings and gametes*. March 16.—Temperature 100° F. March 18.—*First* injection of trypsin and amylopsin. March 19.—Evening temperature 102° F. (due to yesterday's injection). March 20.—Temperature normal; blood negative. March 22.—Temperature normal. *Second* injection of trypsin and amylopsin. March 25.—Discharged to duty. Up to June 16, 1913, no relapse and no further symptoms.

CASE VI.—Private S., No. 8,561.—Malignant tertian malaria. Contracted malaria in January, 1913. Was in hospital from January 31 to February 14, suffering from a severe attack, since when he has been taking quinine regularly. March 4.—Arrived in Maymyo, attending three times a week for quinine. March 15.—Reported sick with a temperature of 102.4° F. *Malignant tertian rings* found in peripheral blood. March 17.—Temperature 101° F. in the evening. March 18.—*First* injection of trypsin and amylopsin. March 19.—Temperature normal. March 22.—*Second* injection of trypsin and amylopsin. March 27.—Discharged to duty. Up to June 16, 1913, no relapse.

CASE VII.—Private S., No. 9,600.—Benign tertian malaria, in which quinine seemed to give no benefit. Contracted malaria in September, 1912. States that he has had three relapses out of hospital. Returned from maneuvers on March 6, 1913. March 21.—Reported sick. Temperature 102.4° F. *Benign tertian gametes* found. Quinine gr. v. four-hourly ordered. March 22.—Temperature, morning 101.2° F., evening 101.6° F. Continue quinine. March 23.—Temperature, morning 100° F., evening 101.6° F. Quinine gr. x thrice daily. March 24.—Temperature, morning 99.6° F., evening 100° F. Continue quinine. March 25-29.—Temperature normal. Continue quinine.

March 30.—Evening temperature 100° F. Severe headache and joint-pains. March 31.—*First* injection of trypsin and amylopsin. Evening temperature 100.2° F. April 1-4.—Temperature normal; no symptoms. April 5.—*Second* injection of trypsin and amylopsin. April 8.—Discharged to duty. Up to June 16, 1913, no relapse and no further symptoms.

After nine days of quinine treatment in this case the parasites were still able to produce fever, severe headache, and joint pains, all of which vanished after *one injection* of the ferments, trypsin and amylopsin.

CASE VIII.—Private W., No. 9,402.—Benign tertian malaria. Contracted malaria in September, 1912, being treated in hospital from October 2 to 11, 1912. Completed a four months' course of quinine treatment in February, 1913. On March 27, 1913, reported sick, with a temperature of 102° F., *benign tertian rings* being found. On April 1 and 5 he received injections of trypsin and amylopsin. On April 10 he returned to duty, since when he has had no further symptoms.

CASE IX.—Lance Corporal F., No. 9,327.—Benign tertian malaria. Contracted malaria in October, 1912, being treated in hospital from November 1 to 12, 1912, and continuing the quinine treatment out of hospital until about the middle of January, 1913. On March 24, 1913, reported sick, temperature 104.8° F., and *benign tertian rings* were found. On April 1 and 5 he received injections of trypsin and amylopsin, the second injection causing a rise of temperature to 100° F. On April 10 he returned to duty, and has since had no further relapse.

CASE X.—Private T., No. 8,014.—Malignant tertian malaria. First admission, severe double infection. May 19, 1913.—Headache and colic. Temperature 102.2° F. Quinine treatment begun. May 20.—*Malignant tertian rings* found in peripheral blood. May 21.—Temperature, morning 103.6° F, evening 102.4° F. Headache severe. May 22.—Temperature 104° and 102.4°. May 23, 101° and 100°. May 24, 99.4° and 100.4°. May 25, 99.2° and 99.2°. May 26, 98.6° and 100°. Quinine treatment stopped. *First* injection of trypsin and amylopsin. Compared with the eight days of treatment with quinine the progress made after one single injection of trypsin and amylopsin is marked. May 27.—Better and brighter. Evening tem-

perature 98.6° F. May 28 to June 3.—Temperature normal. No further symptoms.

CASE XI.—Private T., No. 9,660.—Mixed infection with debility. Patient a tall lank phthinoid subject. Contracted malaria in January, 1913. March 16.—Admitted to hospital with pneumonia of right base. March 22.—Temperature 101° F. Blood examination showed numerous *benign tertian rings* and *malignant tertian rings* also. Quinine treatment begun. April 8.—Discharged from hospital, but continuing the quinine treatment as an out-patient.

Relapse.—April 15, 1913.—Admitted to hospital. Temperature 103.8° F. Malignant tertian rings in great numbers. April 16.—*First* injection of trypsin and amylopsin. April 17.—Evening temperature 100.6° F. April 18.—Temperature normal. April 19.—Temperature, morning 98.6°, evening 100° F. *Second* injection of trypsin and amylopsin. April 28.—Temperature continuing normal. Blood negative. *Third* injection of trypsin and amylopsin. May 3.—Returned to duty. Seen June 15, 1913. No relapse and no further symptoms.

CASE XII.—Private H., No. 9,535.—Malignant tertian malaria with cerebral symptoms. First admission. Severe cerebral type of case and double infection. May 12, 1913.—Detained. Temperature 102° F. at noon, 104° F. at 3 p. m. Blood-smear negative. May 13.—Temperature, morning 101.6°, evening 104° F. May 14, 100° and 102.4°. May 15, 99.6° and 105°. May 16, 98° and 103°. May 18.—*Malignant tertian rings* found. Quinine treatment ordered. May 19.—Transferred to my care. Headache very severe. Restless. Continuing the quinine treatment. May 20.—Headache and restlessness more marked, and patient became comatose. *First* injection of trypsin and amylopsin. May 21.—Headache gone. Patient looks fresh and eyes bright. Temperature now 99° F. All symptoms vanished. May 26.—*Second* injection of trypsin and amylopsin. June 5.—Discharged from hospital to duty.

“If a doctrine be challenged,” said Pasteur, “it happens seldom that its truth or falsehood cannot be established by some crucial test. Even a single experiment will often suffice either to refute or to consolidate the doctrine.” Again, the great investigator, Emil Fischer, set up the doctrine of “lock and key” regarding the action of ferments by two

experiments, and two only. The first experiment was to observe the fact, the second to confirm it.⁸ In the foregoing pages twelve experiments are set forth and every single one of these confirmed the scientific conclusions, which led to their being made. For, as Carl Ernst von Baer wrote long ago, "That which always repeats itself cannot be conditioned by chance or passing caprice, but must depend upon a necessity."¹⁰

REFERENCES.

1. Ball, Eustace Reynolds: "Outfit and Equipment," 1912, loc. cit. p. 47.
2. Minchin, E. A.: "Introduction to the Study of the Protozoa," 1912, loc. cit. p. 361.
3. Beard, J.: "On the Occurrence of Dextrorotatory Albumins in Organic Nature," *Biol. Centralblatt*, Vol. XXXIII, pp. 150-170, 1913. Also in *MEDICAL RECORD*, March 29, 1913.
4. *Idem*: "The Interlude of Cancer," *MEDICAL RECORD*, 1907.
5. Abderhalden, Emil: "Schutzfermente des tierischen Organismus," Berlin, 1912.
6. Beard, J.: "The Enzyme Treatment of Cancer," London, 1911, loc. cit., pp. 185 and 209.
7. Valley-Radot, René: "La Vie de Pasteur," Paris, 1901.
8. Fischer, Emil: "Bedeutung der Stereochemie für die Physiologie," in *Zeitschr. f. physiol. Chemie*, Vol. XXVI, 1898-99, p. 81.
9. Baetzner, W.: "The Trypsin Treatment of Surgical Tuberculosis," *The Practitioner*, January, 1913, pp. 203-219.
10. Baer, Carl Ernst von: "Reden," Vol. 1, 2te Auflage, 1886, p. 40.

8 BARNTON TERRACE, EDINBURGH.



A COMPOSITE PHOTO-SIMILE

MEDICAL RECORD

A Weekly Journal of Medicine and Surgery

WILLIAM WOOD AND COMPANY, Publishers, 51 Fifth Avenue New York

\$5.00 Per Annum.

PUBLISHED AT NEW YORK EVERY SATURDAY

Single Copies, 16c.

ORIGINAL ARTICLES.

Radium for the Treatment of Cancer and Lupus. By William J. Morton, M.D., New York.
Cutaneous Tuberculin Vaccination in the Diagnosis of Tuberculosis. By William J. Butler, M.D., Chicago.
Prevention of Death During Anesthesia by Chloroform and Ether. By Robert Royburn, A.M., M.D., Washington, D. C.
What Shall We Do with Far Advanced Cancer of the Large Bowel? By R. G. Coffey, M.D., Portland, Ore.
Sanitation of the Canal Zone. By Colonel William C. Gorgas, M.D.
Vaginal Implantation of Adenocarcinoma of the Uterus. Blood Metastasis in Recurrent Carcinoma. By Geo. W. Kaan, M.D., Boston, Mass.
Relation of Accidents to Functional Nervous Diseases and Psychoses. Medico-legal Considerations. By Alfred Gordon, M.D., Philadelphia, Pa.
Diseases of the Gastrointestinal Tract on the Borderland between Surgery and Internal Medicine. By John C. Hemmelen, M.D., Ph.D., L.L.D., Baltimore, Md.
The Organic Factor in High Blood Pressure. By Alexander Haig, M.A., M.D., Oxon, London.
Primary Melanosis of the Palate: Nasopharyngeal Flap of Recent Sarcomatous Origin. By J. N. Roy, M.D., Montreal, Canada.

EDITORIALS.

Contradictory Advice to Consumptives. The Army Canteen.
The Dangerous Effects of Ether and Chloroform.
Preventive Medicine.
A Case of Missed Labor.

EDITORIAL NOTES.

The Causation of Appendicitis.
To Accelerate the Course of Labor.
The Period of Infection in Typhoid Fever.
Aseptic Operating.
The Technique of Spinal Anesthesia.
The Infection of Scarlet Fever.
The Effect of Athletic Contests on the Health.
Treatment of Constipation by Abstinence from Meat.
The New Tuberculin Reactions.
Early Mercury Treatment and Syphilis.
Nervous Diseases.

NEWS OF THE WEEK.

Against Cigarettes in Michigan—"Outlook for the Blind"—Typhoid Investigation in Trenton—Codification of Regulations of the Chicago Health Department—Study of Speech Defects—Vaccination Rule Sustained in Chicago—Confederation of Students Societies—Makes Doctors His Victims—Physicians' Building for Cleveland—Druggist Convicted—The Nicholas Senn Estate.

CORRESPONDENCE.

Our London Letter
Our Paris Letter
Our Berlin Letter
Our Letter from the Philippines.
Our Letter from Copenhagen.

PROGRESS OF MEDICAL SCIENCE.

Acutonuria and Laparotomy—Trypsin in the Treatment of Malignant Tumors—Varicose Veins, Their Treatment by Multiple Short Incisions—Arteriosclerosis—Upper Respiratory Obstruction and Oral Deformity—Subacute Polymyositis—Dementia Praecox
Mutual Relations of Upper-Air Tract, Jaws and Teeth—The Diagnosis of Appendicitis—Corneal Anesthesia in Cerebrospinal Meningitis.
The Value of Vaccine Therapy in the Treatment of Bacterial Disease.

BOOK REVIEWS.

American Practice of Surgery. A Complete System of the Science and Art of Surgery, by Representative Surgeons of the United States and Canada. Editors, Joseph D. Bryant, M.D., and Albert H. Buck, M.D. Complete in eight volumes.
The Medical and Surgical Knowledge of William Shakespeare. With Explanatory Notes. By John W. Wainwright, M.D.
A Textbook of the Practice of Medicine, For Students and Practitioners. By James Macdonald French, M.D. Third revised Edition. 135 Illustrations, 25 Being Full-page Plates in Tints and Colors.
Manuel de Gynécologie pratique. Par J. Barrois. Préface de M. L. G.
Medical Jurisprudence, Forensic Medicine, and Toxicology. By R. A. Wittbein, A.M., M.D., Professor of Chemistry, Physics, and Toxicology in Cornell University.
Manual of Hygiene and Sanitation. By Kenneth Eckert, M.D. Fourth Edition. Enlarged and Thoroughly Revised. Illustrated with Ninety-three Engravings.

SOCIETY REPORTS.

Medical Society of the State of New York.
General Meeting
Southern Surgical and Gynecological Association
American Medical Association.
Section on Practice of Medicine.
Joint Meeting with Section on Pharmacology and Therapeutics.
American Laryngological Association.
American Public Health Association.
Sixth International Dermatological Congress.
New York Academy of Medicine.
Section on Pediatrics.
Section on Surgery.
Section on Obstetrics and Gynecology.
Section on Medicine.
Mississippi Valley Medical Association.
Medical Section.
American Therapeutical Society.
Philadelphia County Medical Society.
Western Surgical and Gynecological Association.
American Gastroenterological Association.
New York Psychiatric Society.
British Medical Association.
Section of Tropical Diseases.

STATE MEDICAL LICENSING BOARDS.

State Board Examination Questions, University of the State of New York.
Answers to State Board Examination Questions, University of the State of New York.
State Board Examination Questions, Illinois State Board of Health.
Answers to State Board Examination Questions, Illinois State Board of Health.
Bulletin of Approaching Examinations.

SURGICAL SUGGESTIONS.

Circumcision—Methoda Augusti Pleas—Urethral Hemorrhage—Strangulated Hernia—Health Report
Dermato-Venerel Don'ts—Burns—Tuberculous Peritonitis—Skin Grafting.

THERAPEUTIC HINTS.

Sweating Hands or Feet—Influenza—Alveolar Abscess—Psoriasis—Parache in Children—Catarrhs, Pharyngitis.

NEW INSTRUMENTS.

A New Stethoscope. By Dunlap P. Penhallow, M.D., Boston, Mass.
A New Bone Drill and Bone Wrench. By Carl Beck, M.D., New York.

MEDICAL ITEMS.

Contagious Diseases. Weekly Statement—Health Reports.
DIRECTORY OF NATIONAL AND STATE MEDICAL SOCIETIES.

JUST PUBLISHED

TEXT-BOOK OF ANATOMY

By D. J. CUNNINGHAM, F.R.S.

THIRD EDITION

Royal Octavo, 1467 pages; 936 Wood Engravings of which 406 are in two or more colors.
Muslin, \$6.00 net; Half Morocco, \$7.50 net.

URGENT SURGERY

By FÉLIX LEJARS. Translated by WILLIAM S. DICKIE, F.R.C.S.

FROM THE SIXTH FRENCH EDITION

Two volumes, large octavo, Vol. One, 631 pages. Illustrated by 458 engravings, in black and colors, and by ten full-page plates.
Muslin, the set, \$14.00 net; Half Morocco, \$16.00 net.

WILLIAM WOOD AND COMPANY, Medical Publishers 51 Fifth Avenue, New York
Copyright, 1914, by William Wood and Company. Entered at the Post-Office at New York as Second-Class Matter.